Channel Tunnel Rail Link

London and Continental Railways

Oxford Wessex Archaeology Joint Venture

Human remains from Saltwood Tunnel, Saltwood, Kent

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1 INTRODUCTION

As part of an extensive scheme of archaeological mitigation undertaken prior to construction of the Channel Tunnel Rail Link, Canterbury Archaeological Trust and Wessex Archaeology were commissioned by Rail Link Engineering Limited to carry out a programme of archaeological excavation at Saltwood Tunnel, north of Saltwood, Kent (NGR TR 615345 136940 to TR 616157 136925). A complex multi-period site was revealed, with evidence for ceremonial and funerary land use as well as for settlement and agriculture.

The excavation results are reported in the Saltwood Tunnel Integrated Site Report, summarised below (Riddler and Trevarthen 2006). Human skeletal remains are illustrated, alongside associated grave details and finds, in the Integrated Site Report grave figures (figs. 23-227). Skeletal elements, bone quantity, age/ sex data and pathology are summarised by feature in the Grave Catalogue (Riddler, McKinley and Skittrell 2006).

Summary of the excavated evidence

Activity earlier than the Bronze Age was mainly restricted to unstratified or residual flint and pottery, but a group of eight Mesolithic Horsham-type retouched points from a small pit-like feature may date to the 7th millennium BC, and three early Neolithic pits attest to activity, perhaps domestic, in the mid-late 4th millennium BC. In the early Bronze Age a barrow cemetery developed. Five barrows and a flat grave dated to the late 3rd-early 2nd millennium BC.

Limited middle Bronze Age evidence, comprising a cremation burial, a small pit and other occasional finds of Deverel-Rimbury pottery, suggest the cemetery was respected until the late 2nd millennium BC but, in the late Bronze Age, a settlement and field-system were established. Early to middle Iron Age agriculture is also attested by ditches and at least one track or droveway. No contemporary settlement remains were discovered, but an early-middle Iron Age inhumation cemetery and a square enclosure, perhaps a mortuary enclosure, were established at some time between the 8th – 4th centuries BC. A middle Iron Age inhumation grave of 2nd to 4th century BC date also lay near the western end of the site.

Early Romano-British domestic finds abounded at the western end of the excavation, mainly near a sunken trackway and in pits and field-enclosures to either side of it. The quantity and range of finds, and the presence of two small cremation cemeteries, strongly suggest a small rural settlement lay close-by. That this settlement waned after the mid-late 3rd century is inferred from a greatly reduced suite of remains, and from progressive infilling of the sunken trackway. Limited occupation, or at least occasional use of the site, is likely to have continued into the later 4th century.

Early Anglo–Saxon evidence from Saltwood Tunnel is dominated by three separate inhumation cemeteries, each located in the vicinity of a Bronze Age barrow. Seventeen graves were excavated within the eastern cemetery, 59 in the western cemetery and 141 in the central cemetery. Both the eastern and western cemeteries appear to have begun in the early 6th century. The eastern cemetery lasted only for one or two generations, whilst the western cemetery continued well into the 7th century. The central cemetery was established during the late 6th century and continued throughout the 7th century. From the early 6th century onwards there were always two cemeteries in use at the same time.

The central cemetery may have begun as a replacement for the eastern cemetery, but its plan subsequently changed with the deposition of four auspicious graves, each set in a north-south line at roughly 40m spacings. Three graves were large weapon burials and the fourth was an inhumation of female gender buried with gold and silver jewellery. The earliest of these graves, at the north of the cemetery, was probably deposited in the early years of the 7th century whilst the latest, at the south, may have been placed there around AD 625. Each burial attracted a range of satellite graves, arranged around it but not encroaching into its burial mound. Later graves spread to the south and the east, with a number of graves placed on the opposite side of the trackway 226. The latest graves within the central and western cemeteries were arranged in neat rows. Three early Anglo–Saxon grubenhäuser were also identified, all of which lay in the vicinity of the cemeteries and a little to the north of them.

Several early medieval ditches and pits towards the eastern end of the excavation mark the location of a small rural site, probably 10th or 11th century in date. Other medieval and post-medieval pottery was recovered from features and topsoil in the north-western corner of the excavation, where elements of the ancient Romano-British landscape may have been exploited as rectilinear fields, or possibly stock-pens (*Ibid*.).

The human remains

Human bone – cremated and unburnt - was recovered from 276 contexts; 87 from SFB99/01 in the eastern and central areas of the site (associated cut numbers prefixed with ‘W’), and 189 SLT98/98C/99 in the central and western areas (associated cut numbers prefixed with ‘C’).

Unburnt bone was recovered from 148 contexts including the remains of two Early Bronze Age burials from SLT99 (graves C4507 and C4619), four early/middle Iron Age burials from SFB99 (graves W1305, W1421, W1732 and W1737) and one Romano-British burial from SLT98 (grave C24). The majority of the bone derived from the Early Anglo-Saxon graves (See Riddler and Trevarthen 2006, figs. 23-227), with *in situ* deposits being recovered from 113 graves (31 from SFB99 and 89 from SLT98C/99); the remaining contexts comprised redeposited bone within grave fills.

Cremated bone was recovered from 128 contexts including the remains of a minimum of 19 burials (some comprising more than one context); two unurned Late Bronze Age/early Iron Age burials from SFB99 (grave W3602) and SLT99 (grave C3711), three early Iron Age unurned burials from SFB99 (graves W1726, W1728 and W3336), three unurned Iron Age/Romano-British burials from SLT 99 (graves C2215, C2233 and C3008), a minimum of nine urned (graves C6, C14, C15, C16, C19, C20, C21, and C337) and one unurned (grave C12) Romano-British burial, and one unurned Early Anglo-Saxon burial from SLT99 (grave C3705). One other Iron Age/Romano-British deposit may represent the remains of an unurned burial with redeposited pyre debris or a deposit of pyre debris (C2210). Redeposited pyre debris was recovered from four features at SFB99 (C1695, C3753, C3709 and C3116) and one from SLT98 (from Romano-British grave 14). The nature of three other Late Bronze Age/early Iron Age deposits (from cuts C1703, C3777 and C3806), one early Iron Age deposit (from cut C1699) and two undated deposits (cuts C1705, C4757) is unclear. Small quantities (generally <5g) of redeposited cremated bone were recovered from the backfills of one Iron Age and 48 Anglo-Saxon inhumation graves (20 from SFB99 and 29 from SLT98/99), and from the fills of a minimum of 11 ditches, three post holes and six pits, most of which were undated.

2 METHODS

The small quantities and very poor condition of the majority of the bone from the inhumation burials (see *Disturbance and Condition*) often rendered it difficult to observe and collect as individual fragments during excavation. Although sampling procedures (see Section 00) ensured recovery of bone from the grave fills even where none had been observed by the excavator, the position of the bone was not always recorded and in some instances it cannot be stated with confidence whether it lay *in situ* or was redeposited within the fill; consequently, the nature of some of the deposits has remained open to question.

Cremation-related deposits were subject to whole-earth recovery in excavation (see Section 00); some were collected as a series of samples or sub-contexts to allow more detailed analysis of the distribution of the archaeological components and these divisions were maintained throughout analysis. A cut containing cremated remains may have comprised several distinct fills representative of different stratigraphic entities relating to a single cremation episode.

The general osteological methodology followed that presented in 'Specialist Study Package 6' of the *CTRL Section 1 Project Design* (RLE 2003). Recording and analysis of the cremated bone followed the writer's standard procedure (McKinley 1994a, 5-21; 2004a). The degree of erosion to the unburnt bone was recorded using the writer's 0-5 system of grading

(McKinley 2004b, fig. 6); where all bone was destroyed and only tooth enamel remains the grading was recorded as '5'.

Age (cremated and unburnt bone) was assessed from the stage of skeletal and tooth development (Beek 1983; Scheuer and Black 2000), and the patterns and degree of age-related changes to the bone and teeth (Miles 1962; Brothwell 1972; Buikstra and Ubelaker 1994). Where possible, sex was ascertained from the sexually dimorphic traits of the skeleton (Bass 1987; Buikstra and Ubelaker 1994). In many of the inhumation burials little or no bone survived and only the tooth enamel remained for examination. Consequently, a series of measurements were taken from all sufficiently complete tooth crowns (medio-lateral and bucco-labial/palatial) so multivariate analysis could be undertaken to try and distinguish male and female groupings (Ditch and Rose 1976; Rösing 1983). The variable integrity of the attributed sex has been denoted as confident, probable ('?') and most likely ('??').
In most cases insufficient bone survived to allow for the recovery of metric data, but where possible a standard suite of measurements were taken (Brothwell and Zakrzewski 2004). No crania were sufficiently complete to allow cranial indices to be calculated and no long bones were sufficiently intact to allow measurements for stature estimation to be made. Other indices were calculated according with Bass 1987. A standard suite of non-metric traits was recorded where possible (Berry and Berry 1967; Finnegan 1978; Brothwell and Zakrzewski 2004).

3 RESULTS

A summary of the results is presented in the *Grave Catalogue* by grave and burial number.

3.1 Disturbance and condition

The variability of bone preservation in relation to the geology of Kent formed part of a review by Mays and Anderson in 1995, who commented on the frequent poor preservation of bone from rural sites as a result of the high alkali conditions associated with the chalk natural. Prior to the CTRL archaeological works, the majority of known cemetery sites in Kent lay on the North Downs, north of the greensand ridge (*ibid.* fig. 1) on which the Saltwood cemetery lay. While a variety of intrinsic and extrinsic factors may affect bone preservation (Henderson 1987; Nielsen-Marsh *et al* 2000; McKinley 2000a, 285-6), the major factor at Saltwood is - as elsewhere in Kent - likely to have been the natural geology, which in this case comprised free-draining acidic greensand through which most of the graves were cut and with which most of them were subsequently backfilled. In the absence of any ameliorating factors this acidic environment will have had a major detrimental effect on bone preservation and survival.

Very few of the graves were intercutting and there had been minimal disturbance from later features or animals, though some graves were attacked by metal-detectorists during the excavation (see Section 00). Almost all the graves had suffered some level of plough damage, however, resulting in varying levels of truncation.

Inhumation burials

The surviving depths of the inhumation graves ranged from 0.03m to 0.86m, with *c.* 20% at 0.20m or less and *c*. 27% greater than 0.50m. Both Bronze Age graves were >0.50m deep, grave C4619 showing the maximum surviving depth for the site at 0.86m; the Iron Age graves ranged from 0.23-0.61m; the Romano-British grave (C24) survived to 0.57m; and the deepest surviving Anglo-Saxon grave was C3946 (south side western cemetery) at 0.76m. Other than in the severely truncated graves – the *c*. 5% at 0.10m or less (all Anglo-Saxon) – and the few subject to later intrusion, it is unlikely that much if any loss of bone from the graves will have occurred as a direct result of disturbance.

Skeletal recovery was generally very poor, but there did appear to be some temporal variation. The percentage skeletal recovery from the two Bronze Age graves was relatively good at 30% and 40%; there was very poor preservation in the Iron Age graves with <1% skeletal recovery comprising tooth crowns only; the Romano-British burial was the best preserved, with 50% skeletal recovery (*c*. 75% on site but the skull was not available for osteological examination having gone missing after excavation). The greatest variability was seen in the Anglo-Saxon graves with *in situ* bone being recovered from only 113 of the 218 graves excavated (maximum 52%); the maximum skeletal recovery was 32%; only 11 graves (5%) contained 10% or more; and less than 1% of the skeleton survived in 75 graves (66% of those with any human remains, 34% of all graves) including nothing more than tooth enamel in 60%.

Table 1: Percentage skeletal recovery in Early Anglo-Saxon graves.

	% graves with surviving bone	**max. skeletal recovery**	**=/> 10% skeletal recovery**	**<1% skeletal recovery**
all graves (218)	52%	32%	5%	34%
Graves with coffined burials (25)	64%	32%	12%	28%
Graves with un-coffined burials (193)	51%	30%	5%	52%

Skull elements were recovered from all except eight of the graves in which bone was preserved; elements of the axial skeleton were recovered from 143 graves, 10 of which included >10% skeletal recovery; elements of the upper limb were recovered from 16 graves,

10 including >10% skeletal recovery; and 37 graves contained elements of the lower limb, 13 of which included >10% skeletal recovery.

The condition of the surviving bone was very poor with high levels of surface erosion. Bone from 87% of graves in which bone survived showed the lowest grade preservation (5), the surface morphology of the remaining bone being totally eroded (this grade also include all those graves in which only the tooth enamel survived). The surviving bone in 13 (11%) graves contained bone at grade 4; two graves (2%) at grade 3; only two deposits (0.1% graves) were recorded at grade 1, one of which was a fragment redeposited in a rubbish pit (C4550); no bone was recorded at grade 0 (no surface modification).

The Anglo-Saxon grave with the highest level of skeletal recovery (C6101) contained an adult male and all eight of those within the highest range of percentage skeletal recovery (>12%) were male. The Bronze Age male also showed a higher rate of preservation than the Bronze Age female and the Romano-British burial was of a male. The second highest recovery rate of 30%, however, was from a grave (C6566) containing the remains of a juvenile (*c*. 8-11 yr.). Amongst the 14 graves with between 2-12% skeletal recovery there was a roughly equal mix of males and females. The better preserved bone included a mix of ages (juvenile-older adult) and both sexes (seven males, two females, rest unsexed), but again predominantly comprised adult males. The data suggest there was preferential preservation of male remains (larger, more robust bones) compared with females, but the relatively high rate of preservation of the juvenile skeleton (gracile bone) indicates the influence of other factors.

Grave depth appears to have been of little significance with regard to bone survival. Although the Early Bronze Age and Romano-British graves were all relatively deep, and the maximum preservation from the Anglo-Saxon cemetery was seen in a grave of 0.50m depth, deeper graves in both the Iron Age and Anglo-Saxon cemeteries contained less bone that many of the shallower graves.

The presence of a coffin seems to have had a positive effect on bone survival within the Anglo-Saxon cemetery (Table 1); bone survived in a higher proportion of the coffined burials than in the un-coffined ones, and a greater proportion of the bone survived. The male Bronze Age burial, the bone from which was better preserved than that from the contemporaneous female burial, had also been made coffined, but the best preserved remains – those of the Romano-British individual, were un-coffined. The presence of a coffin will have resulted in a slightly a different burial environment, particularly providing an - admittedly temporary - barrier between the grave fill and the body.

Some form of grave good was recovered from *c*. 59% of the Anglo-Saxon graves. Of those graves from which bone was recovered, 81% contained one or more item, only 24% being devoid of goods. Of those graves with 10% or greater skeletal preservation, 58% contained grave goods compared with 42% without, the proportions increasing to 75%

compared with 24% for graves with 1% recovery or greater. These figures suggest that the presence of grave goods within the burial was a factor in bone preservation, however, there was little direct correlation between the position of the extant items and the surviving bone; green copper-alloy staining to bone was observed in remains from only four graves – in two cases to tooth crowns and in two others to the hip region (all adults including one male) – with dark brown staining (?organic) to the tooth crowns of a juvenile. In general, however, it was not the proximity of an item to bone which resulted in its preservation. There may be a number of explanations for this phenomena. Some of the features interpreted as graves on the basis of shape – that is they contained neither bone nor grave goods – may have either been misinterpreted or represented cenotaphs. The graves which contained extant grave goods may also have held greater amounts of organic materials which sufficiently altered the chemistry of the burial microenvironment to assist in bone preservation.

Grave location seems to have been of little significance to bone survival and preservation. One of the two Bronze Age graves lay towards the western margins of the site whilst its contemporary lay roughly central to the western round barrow later used as a focus for Anglo-Saxon burials. The Iron Age graves lay towards the eastern margins of the site and the Romano-British grave on the western margins. Similar proportions of the Anglo-Saxon graves from SFB99/01 (eastern half of site) and SLT98/98C/99 (western half) contained bone (*c*. 58% and *c.* 53%), and those graves with >1% skeletal preservation were found across a wide spatial range and within various grave forms.

The fill of the Romano-British grave C24 differed markedly from others on site (see Section 00) in its dark colour and frequent fuel ash inclusions, the grave having cut through an earlier 'industrial' deposit. The Bronze Age grave C4619, central to the western barrow, also included a layer of charcoal/dark organic material in addition to its coffin, and the fill was interpreted as containing lumps of turf/old ground surface. These variations in the microenvironment of the burial will have been sufficient to enhance bone survival. Graves cut through the fills of the earlier Bronze Age ring ditches showed no better bone survival that did those cut directly into the natural, indicating that the ditches were probably backfilled simply by the material dug out of them in the first place.

Cremated bone

The surviving depth of the cremation graves and other features containing cremation-related deposits ranged from 0.03-0.40m; 44% surviving to 0.10m or less, 68% to 0.20m or less and only 8% >0.30m. Although loss of bone from some deposits had doubtless occurred as a result of truncation, the deepest features did not contain the greatest amounts of bone; only 134g of bone was recovered from the Late Bronze Age/early Iron Age grave W3602 (0.40m) and 11.4g from the early Iron Age grave W3336 (0.32m). The greatest quantity of bone was

recovered from the Romano-British grave C3337 (0.21m deep), followed by the Anglo-Saxon grave C3704 (0.28m), and the Late Bronze Age/early Iron Age grave C3711 (0.07m).

The visual condition of the cremated bone was good, and trabecular bone – most prone to disintegration in burial conditions adverse to good bone survival (McKinley 1997a, 245; 2004c, 285) – is well represented within the burials, though none was found amongst the bone redeposited in inhumation graves. The protection offered by the urns within the Romano-British burials, insulating the bone from the grave fill (at least until they were disturbed) will have aided preservation. The majority of the unurned burials also contained redeposited pyre debris within the grave fills and the presence of the alkaline fuel ash will have had an ameliorating affect on the acidity of the natural soil. Consequently, although some trabecular bone may have been lost from a few burials due soil acidity the indications are that this was probably not very great.

Small quantities of cremated bone – excluding trabecular bone – were recovered from 49 inhumation graves, mostly Anglo-Saxon but including one Iron Age grave (W1411) from the eastern cemetery. Some of the inhumation graves were in the same vicinity as known cremation burials, as around the western barrow, and the cremated bone may have derived from disturbed burials or pyre sites. Fewer cremation graves were found around the central barrow and the distribution of graves containing cremated bone was more wide-spread suggesting more extensive disturbance, possibly from material contained within the original barrow mound. Cremated bone was also found in the inhumation graves to the east of the central bridleway and around the eastern barrow where no cremation burials were found. The overall implication is that there were once many more cremation graves associated both with all three barrows and possibly within flat cemeteries distributed between them, which were subsequently obliterated.

3.2 Demographic data

Each of the graves – inhumation and cremation - from which human bone was recovered included the remains of a single individual with the exception of the Anglo-Saxon inhumation graves W1490 and W1810.

Inhumation burials

A minimum of 122 individuals were identified amongst the remains from the inhumation burials (Table 2).

Table 2: Summary of age and sex distribution amongst individuals from inhumation burials by phase.

(NB. age ranges shown are those observed within each category not necessarily the full range encompassed by the category; sexing includes all levels of confidence, see catalogue entries for individual levels).				
	Early Bronze Age	*early/middle Iron Age*	*Romano-British*	*early Anglo-Saxon*
Immature				
infant (0.5-5 yr.)				3 *(3%)*
infant-juvenile (3-8 yr.)				5 *(4%)*
juvenile (6-10 yr.)				10 *(9%)* inc. 4 Ψ
juvenile-subadult (7-18 yr.)				3 *(3%)*
subadult (13-18 yr.)				6 *(5%)* inc. 4 Ψ
subadult-young adult (14-25 yr.)		1Ψ		9 *(8%)* inc. 5Ψ
Adults				
young adult (18-25 yr.)		1		14 *(12%)* inc. 5 Ψ & 2 Ξ
young-mature adult (18-40 yr.)				18 *(16%)* inc. 8 Ψ & 2 Ξ
mature adult (25-45 yr.)	1Ξ			22 *(19%)* inc. 7 Ψ & 2 Ξ
mature-older adult (>25 yr.)				5 *(4%)* inc. 1Ψ & 1Ξ
older adult (>45 yr.)	1Ψ		1Ψ	4 *(3%)* inc. 2Ψ & 1 Ξ
Unallocated				
> 2 yr.				5
juvenile-adult (>5 yr.)				2
subadult-adult (>13 yr.)		1		7 inc. 1 Ξ
adult (> 18 yr.)		1		2 inc. 1Ψ
TOTAL	**2** 1 Ψ & 1 Ξ	**4** 1Ψ	**1**Ψ	**115** 38Ψ & 9Ξ

The pre-Saxon graves were small in number. The Iron Age and Romano-British graves - each of which lay within the vicinity of contemporaneous cremation burials - were situated on the north-eastern and western peripheries of the site respectively, and may have formed part of more extensive dispersed grave groups relating to contemporaneous populations. There is, therefore, little significant demographic comment which can be made with reference to these few early remains (see *Cremation burials*).

Discussion of the population structure within the Anglo-Saxon cemeteries is hampered as a result of poor bone survival. There appears (see *Disturbance and Condition*

above) to have been a bias towards the preservation of adult male remains above those of immature individuals and females. Preservation was also slightly enhanced by the inclusion of grave goods and the use of coffins with potential cultural and status biases attached to both factors. The osteological sex attributed to individuals is generally inconclusive; none of the females and only five of the males could be sexed with confidence, the rest being either 'probable' (two males) or 'most likely' (30 males and all nine females). As there were very few graves in which bones exhibiting the sexually dimorphic traits of the skeleton survived an attempt was made to use tooth size – which has been demonstrated to display sexual dimorphism within individual populations (see *Methods*) – to broaden the scope of the analysis. A broad distribution was seen in the size of teeth from individuals but there were relatively few for whom other criteria existed against which to test the validity of this data (10 males, six with secure sexing, three with 'probable' and one 'most likely'; eight females including two 'probable' and six 'most likely'). Although males sexed via other traits tended to fall in the upper ranges, there was a wide distribution and a broad overlap between the sexes, and the measurements from one male – W1575 (grave W1491) – persistently fell within the low ('female') ranges. Consequently, many individuals were excluded – for example, those with only one or two teeth from which measurements could be obtained, or who's measurements for individual teeth covered an inconsistent and/or broad range - and the confidence ratings attached to the 39% of the surviving population who were sexed are generally low. Similar problems of poor preservation have been encountered in many of the Kentish Anglo-Saxon cemeteries (Tester 1968, 128; Powers and Cullen 1987, 197-8; Mays and Anderson 1995, 364; Anderson and Andrews 1997, 214; Powers forthcoming) which limits the amount and detail of local comparative data.

Twenty-four percent of the population comprised immature individuals, increasing to 31% if subadult-young adults are included (Table 2). Although the highest proportion fall within the juvenile range (5-12 yr.) it is highly likely that infants (0-5 yr.) are under-represented; this is commonly the case in archaeological populations (e.g. Anderson and Andrews 1997, 217-8) and with the very aggressive burial environment conditions at Saltwood, the fragile remains of such young individuals will undoubtedly have suffered. The median age range falls between 30-40 yr., though a potential 7% of the population may have survived to old age with at least three individuals (apparently male) of over 50 years. Whilst there are proportionally greater numbers of males within the lower age ranges than in the older adult ranges compared with a more even distribution of females, the low number of sexed individuals, lack of confidence and potential biases within the data outlined above limit the significance of this observation.

The figures are not significantly different from those recorded from contemporaneous sites in the region, being closest in the proportions of immature to adult individuals to Mill

Hill and Cuxton, Orpington and Dover Buckland both having much lower percentages of immature individuals (Table 3). The proportion of immature individuals from Saltwood, Cuxton and Mill Hill are all above the average of 21% of the population shown by Anderson and Andrews (1997, table 18) for Anglo-Saxon cemeteries nationally, all falling in the upper range. The proportions of young, mature and older adults are similar to those seen elsewhere, with the majority of adults in the 'mature' range; more detailed breakdown is difficult due to intra-site overlaps in age ranges and infra-site variations in age categories, but Saltwood appears to have fewer older adults than Cuxton (*c*. 20%).

Table 3: Demographic data from some contemporary Kentish cemeteries.

NB: Data may have been adjusted to fit categories being used in this report. * Based on results from osteological analysis only.

Site	No. identified individuals	% immature individuals	% adults	% adult females	% adult males
Orpington (Tester 1968)	21	19% incomplete data	81%	52%	29%
Dover Buckland (Evison 1987, table 14*)	140	14% 30% infant; 45% juvenile; 15% subadult	79%	28%	36%
Mill Hill, Deal (Anderson and Andrews 1997)	74	28% 24% infant; 33% juvenile; 43% subadult	66%	22%	23%
Cuxton (Powers forthcoming)	35	30% 40% infant; 50% juvenile	70%	18%	18%

Viewed overall the cemetery group has the appearance of a normal domestic population. The burial group associated with the western barrow includes adults of both sexes, but the males appear to have a more dispersed distribution. Very few immature individuals are represented, only two subadults being identified amongst the barrow group. The largest burial group, associated with the central barrows, includeds few identified females and the males appeared to be dispersed. There were few immature individuals assiciated with the largest central barrow, most – including all the infants idenified - seem to have been spread to the south in association with the penannular ditches. The grave rows to the east of the holloway/bridleway seemed to contain mostly males in the main compact eastern line with the females being within the graves in the more discontinuous western line. It also apears as though the adults were placed towards the ends of the lines. No females were idenified amongts the remaisn associated with the eastern barrow and only two immature individuals, a subadult and a juvenile. Although there are some apparent patterns of spatial distribution associated with age

and sex the data must be treated with caution since the age and sex of the occupants of many of the graves is unknown.

It cannot be stated with confidence that graves W1490 and W1810 represent the remains of genuine dual burials; as with many of the other Anglo-Saxon graves, the remains comprised only tooth crowns. Two groups of tooth crowns – an unsexed adult 18-25 yr. and an infant 0.5-5 yr. - were recovered from the west end of grave W1810 and it is probable that both individuals were buried contemporaneously. In the case of grave W1490, neither set of teeth were positioned as might be expected towards one or other end of the grave, being in a more central position (Riddler and Trevarthen, 2006, fig. 56), and either or both - a male subadult 13-15 yr. and a juvenile/subadult 7-14 yr. - may have related to a redeposited skull rather than *in situ* remains.

Cremation burials

A total of 20 individuals were identified from amongst the cremation burials; Table 4 gives the breakdown by phase. The remains of two other individuals (both subadults) have been included amongst the minimum number counts – bringing the total to 22 – since, although redeposited (in inhumation grave C1137 and ditch W3638), the age of the individuals and position of the remains indicate they cannot have derived from any of the same cremations as represented amongst the remains within the identified burials. The common recovery of small amounts of cremated bone from the fills of inhumation graves has already been discussed above; some is likely to have originated from pyre sites or redeposited pyre debris and may have derived from cremations represented amongst the extant burials; others are likely to represent the remains of disturbed burials. As it is impossible to distinguish which may and which may not be represented by individuals identified elsewhere within the assemblage this material has not been included in the minimum number counts. Similarly, at least five deposits represent the remains of redeposited pyre debris (see Section III. 5 and Catalogue) and may, therefore, already be represented within the minimum number counts. The nature of six other deposits – denoted cremation-related deposit - is open to question (see Section III.5 and Catalogue) and consequently they too have had to be excluded from the minimum number counts.

The surviving Late Bronze Age/early Iron Age and late Iron Age/Romano-British burials were generally scattered within the central-western area of the site, one set within the confines of the western barrow and the rest dispersed across the area. The presence of other features containing cremated bone, including Anglo-Saxon inhumation graves, within these areas suggest there may originally have been a focus around the two barrows, at least for cremation if not for burial.

Table 4: Summary of age and sex distribution amongst individuals from cremation burials by phase.

(NB. age ranges shown are those observed within each category not necessarily the full range encompassed by the category; sexing includes all levels of confidence, see catalogue entries for individual levels). * denotes remains not recovered from a grave.						
	un-phased	*Late Bronze Age/early Iron Age*	*early Iron Age*	*Iron Age/ Romano-British*	*Romano-British*	*early Anglo-Saxon*
infant (0.25-1.5 yr.)			1			
subadult (13-18 yr.)	2*					
young adult (18-25 yr.)					1Ξ	
mature adult (25-40 yr.)				1Ξ		
mature-older adult (>25 yr.)		1 Ξ1 Ψ		1Ξ	4 inc. 2 Ξ	1Ξ
older adult (>45 yr.)					1Ξ	
subadult-adult (>13 yr.)				2	1	
adult (> 18 yr.)			2 inc. 1 Ξ		3 inc. 1Ψ	
TOTAL	**2***	**2** 1 Ψ & 1 Ξ	**3** 1Ξ	**4** 2Ξ	**10** inc. 4Ξ & 1Ψ	**1** Ξ

Two of the early Iron Age cremation graves form part of a small group of similarly dated features, including six inhumation graves (three with extant bone), situated on the eastern peripheries of the site; the cremation graves cut through a small enclosure ditch. The assemblage appears to represent a small domestic group probably associated with an adjacent farmstead and is typical of small rural grave groups of this date. One other early Iron Age grave, W3336, containing infant remains, was situated well to the south of all other known burials. Such singletons have been found in rural locations across a broad temporal range and may include the remains of individuals of either sex and across the age ranges; it is difficult in this instance to know if there is any significance to the very young age of the individual, whether the burial was deliberately made away from the others, or even if it relates to the same population group. There are relatively few Iron Age burials from Kent, mostly concentrated along the north-east coast and comprising – as here - small groups or singletons with burial largely by inhumation, some cemeteries including mixed rites (Mays and Anderson 1995; Parfitt 1995). Mill Hill, Deal (Parfitt 1995) represents the largest cemetery to date with 42 inhumation and five cremation burials (latter all adult, the two sexed individuals being male; see above *Inhumation burials*).

The Romano-British burials form a small group with two outliers (graves C22 and C337) on the western margins of the site, which also includes one inhumation burial. Although it is plausible that further graves of this date were situated to the west, such small

grave groups are commonly seen in rural locations and probably relate to a single farmstead situated in the immediate vicinity. The apparent preponderance of females is probably misleading in that only 50% of the individuals identified were sexed and it has previously been observed that there appears to be a bias towards the ease of identifying females amongst cremated remains (McKinley 2000b, 266). The absence of any immature individuals from this relatively large group is unexpected; individuals of all ages may be afforded the mortuary rite of cremation (McKinley 2004c, table 6.1) and even the remains of neonates have been recovered (McKinley 1992). However, the weights of bone from the burials were generally rather low and it may be that if dual cremations of an adult with a child were undertaken, that none of the latter's remains were included in the burial (see Section III.5); alternatively, immature individuals may have been buried outside the scope of the excavation. Kentish Romano-British burials tend to be concentrated in the north and NE of the county and include some large cemeteries though the number of cremation burials is relatively few and mostly – as here - derived from mixed-rite grave groups (Mays and Anderson 1995). Three small grave groups were found at Each End, Ash (Hicks 1998), totalling 14 cremation burials (one other – S22 - appears to represent a cenotaph rather than a burial) and one inhumation burial; all contained adult remains and all that could be sexed were female.

3.3 Metric and non-metric data

The only indices which could be calculated were the platymeric (degree of anterior-posterior flattening of the proximal femur) and platycnemic (meso-lateral flattening of the tibia) indices. The platymeric index was calculated for five individuals including the one Romano-British burial (male) and four Anglo-Saxons (two ??males, two unsexed). The platycnemic was calculated for four individuals including the Romano-British male and three Anglo-Saxons (one ??male, one ??female, one unsexed).

Table 5: Summary of ranges within platymeric and platycnemic indices

NB: Where a range is shown for a single individual, the difference is between the sides				
	platymeric index		***platycnemic index***	
	range	type	range	type
Romano-British				
Male	73.0-83.2	platymeric	57.6	platycnemic
Anglo-Saxon				
Males	73.7-75.1	platymeric	89.2	eurycnemic
Female			65.9-81.6	eurycnemic & mesocnemic
Unsexed	81.4-86.7	eurymeric	76.6-85.1	eurycnemic

The relatively broad difference between the left and right femora in the Romano-British male is probably a reflection of uneven mechanical stress in what were both large robust bones; the

left showing less anterior-posterior flattening than the right. The readings for the Anglo-Saxon males are close, as are those for the unsexed individuals, but the two sets are relatively widely divergent. While this may suggest variable homogeneity, with such very small numbers and the lack of further osteological information about these individuals it would be unwise to draw such conclusions from the data. There is no way of knowing if there was any link between squatting facets and platycnemia such as has been indicated elsewhere (Brothwell 1972; Molleson 1993) since no distal tibiae survived.

Variations in skeletal morphology may, with other predisposing factors, indicate genetic relationships within a 'population'. There are, however, problems with the uncertain heritability of traits (Berry and Berry 1967; Tyrrell, *pers. comm.*) and some traits have been attributed to developmental abnormalities, for instance, extra sutural ossicles or wormian bones (Brothwell 1972, 95-98), and the aetiology remains debatable.

Table 6: Summary of non-metric traits recorded from Anglo-Saxon inhumation burials. (Includes only observable traits).

Trait	**Presence**		**Absence**	
	left	*right*	*left*	*right*
Skull				
Metopic suture			5	
Supra-orbital notch	1	3	2	1
Supra-orbital foramen	1	2	2	1
Zygomatic-facial foramina		1		
Parietal foramen			5	6
Sutural bones: lambda			6	
Sutural bones: lambdoid	1	1	4	5
Sutural bones: coronal		1	1	
Sutural bones: parietal notch			1	
Sutural bones: asterion		1	1	1
Sutural bones: bregma			3	
Double condyle facets			1	
Auditory exostosis (torus)			5	7
Mastoid foramen (extrasutural/sutural)	2 Ex	4Ex 2 S		3
Mental foramen (number)				1
Mandibular torus			3	4
Palatine torus			3	3
Axial skeleton				
Atlas bridging: lateral		1	1	2
Acetabular crease				1
Upper limb				
Circumflex sulcus				1

Trait	Presence		Absence	
	left	*right*	*left*	*right*
Lower limb				
Os trigonum			1	
Medial talar facet			1	
Lateral talar extension			1	
Anterior calcaneal facet double			1	

Non-metric variations were observed in the remains of 29 individuals including one early/middle Iron Age, one Romano-British (cremated) and 27 Anglo-Saxon (23% of those identified: Table 6). Not surprisingly in view of the condition of the assemblage, most variations were observed in the teeth, most commonly a 5-cusp form to the mandibular third molar (16 individuals, including the one Iron Age); one individual had a 6-cusped form and four had multi-cusped forms. In two individuals the mandibular second molars also had 5-cusps. In three individuals the mandibular M3 was triangular rather than the normal rectangular shape, the M2 showing a similar variation in one of the same individuals. Sutural ossicles were observed in five individuals (including the one cremated Romano-British individual); most were seen in the lambdoid suture with one in the coronal. There are no apparent spatial connections between individuals sharing traits which may suggest homogeneous groupings.

3.4 Pathology

Pathological lesions were observed in the remains of 69 individuals, including six from cremation burials and 63 from the inhumation burials. The cremated individuals included both Late Bronze Age/early Iron Age, one Iron Age/Romano-British (25%), two Romano-British (20%), and the one Anglo-Saxon. The individuals from the inhumation burials included both Bronze Age, two early/middle Iron Age (50%), the one Romano-British and 59 Anglo-Saxon (51%). Amongst the latter, a higher proportion of those individuals identified as males (all levels of confidence) were affected (83%) in comparison with those identified as female (67%), though the significance which may be attached to this observation is punctuated by the various provisos discussed above (see Section III.2). No lesions were observed in the five Anglo-Saxon orbital vaults recovered.

Lesions were also observed in cremated (four contexts) and unburnt (four contexts) redeposited bone.

Inhumation burials

Dental disease

Dental diseases often represent the most common form of pathological conditions recorded amongst archaeological material and given the poor condition of the human remains from Saltwood the majority of the lesions observed were in the teeth. Some form of dental lesion was observed in 31 of 39 male permanent dentitions including one Bronze Age and one Iron Age; six of 10 female dentitions including one Bronze Age; 24 of 51 unsexed dentitions, including one Iron Age; ie. 49% of the identified Anglo-Saxon population.

Dental calculus (calcified plaque/tartar) harbours bacteria which predispose to periodontal disease and the development of dental caries. Calculus deposits were noted in 48% of dentitions, including two Bronze Age and two Iron Age. Deposits were probably originally present on all teeth but the poor condition of the remains has resulted in much of it being dislodged; it was also difficult to confidently judge the severity of the condition in individual cases, most tooth roots had been lost and in almost half the dentitions the only surviving evidence was a 'tide-mark' on the crowns. Where severity could be judged, the majority of lesions in the Anglo-Saxon dentitions were mild in both sexes (65% male, 67% female, 44% unsexed), with mild-moderate deposits in 17% male dentitions and 44% unsexed, and moderate deposits in 18% male dentitions, 33% female and 11% unsexed (Brothwell 1972, fig. 58b); no heavy deposits were observed. The female Bronze Age dentition showed mild deposits, the male mild-medium.

Slight periodontal disease (a gum infection which may lead to bone resorption; Brothwell 1972, fig. 58a) was observed in two Anglo-Saxon mature adult male dentitions. Given the low recovery rate of the dental supportive structures (11 individuals including; Bronze Age male and female; eight Anglo-Saxon males, one female and two unsexed; all only partial) this cannot be taken as a representative reflection of prevalence.

Table 7: Summary of Anglo-Saxon permanent dentitions.

	no. dentitions	no. teeth	no. socket positions	*ante mortem* tooth loss	caries
Female	9	63	2		1 (1.6%)
Male	37	532	86	4 (4.6%)	11 (2.1%)
Unsexed	50	378	29		3 (0.8%)
Total	96	973	117	4 (3.4%)	15 (1.5%)

No *ante mortem* tooth loss was observed in the Bronze Age dentitions. The rates seen in the surviving Anglo-Saxon could be misleading in that so little of the supportive structures survived for analysis; all four teeth lost *ante mortem* were seen in an elderly male (mandibular

premolars and molars). The overall rate falls within the lower range of those observed in populations of this date elsewhere (Anderson and Andrews 1997, table 24) but is lower than the 5.5% from Mill Hill (*ibid.*) and the 6.9% from Apple Down, West Sussex (Harman 1990).

No dental caries were observed in either of the surviving Iron Age or Bronze Age dentitions. The lesions recorded in the Anglo-Saxon dentitions may, again, be misleading since some small cervical lesions may have passed undetected due to loss of the tooth root from the teeth counted as present, and crowns affected by gross lesions may have suffered preferential lost due to the weakened tooth structure. Lesions were seen in six male dentitions, one female and one unsexed dentition; *c*. 60% in the mandibular right side (most individuals). Lesions were also observed in three deciduous molars from an immature dentition. All surviving lesions were very small and occlusal in origin; in contrast to what is commonly noted elsewhere (Miles 1962, fig. 8; Harman 1990, table 2.6) there is no clear link between increased rate and age. The overall rate is again within the lower ranges reported elsewhere (Anderson and Andrews 1997, Table 25) but lower than the 3.8% recorded for Mill Hill (*ibid*. 232), both being much lower than the 10% from Apple Down (Harman 1990).

Unsurprisingly, no dental abscesses were observed in the Anglo-Saxon dentitions. Two lesions were seen in the Bronze Age female dentition (18% female; 6.9% overall Bronze Age).

Dental hypoplasia is a developmental defect in the tooth enamel formed in response to growth arrest in the immature individual, the aetiology of which may include periods of illness or nutritional stress (Hillson 1979). Slight defects, manifest as 1-3 faint lines, predominantly in the anterior tooth crowns, were recorded in one Iron Age, and 40 Anglo-Saxon dentitions including those of 23 males (62%), two females (22%) and 15 unsexed individuals (30%). The high proportion of unsexed individuals render it inappropriate to draw any conclusion with regard to the apparent variation between the sexes.

The levels of occlusal dental attrition are light; the assessed attrition rates indicating that individuals between 25-35 yr. would have only slight-moderate polishing of individuals molar cusps, with very slight-moderate exposure of dentine in the individual cusps of the 1st and 2nd molars, occasionally with slight amalgamation between 1st molar cusps. By comparison, wear to the anterior teeth is often heavy; the maxillary incisors from burial C6517 (>35 yr.) were particularly heavily worn for example, the angle of wear suggesting a pronounced over-bite with exposure of the pulp cavity in the right tooth.

The low levels of dental attrition amongst the adults are not consistent with a diet of coarse, fibrous foodstuffs or one accidentally adulterated with gritty material during food processing; together with the relatively heavy attrition to the anterior teeth this is indicative of a diet necessitating frequent ‘cutting’ of food-stuff but relatively little ‘grinding’, and could also be related to food preparation. The apparent low calculus deposits (though this could be

misrepresentative; see above) also suggests the diet was not over-dependant on carbohydrates, though dental hygiene may have been a contributory factor (Hillson 1990, 287). The low rates of carious lesions – if reflective of the true caries rates – would support the implication of the other observations in suggesting a diet rich in meat proteins (Hillson 1990).

Infections

Minor lesions indicative of infection were observed in the remains of a minimum of two individuals. Patchy active periosteal new bone was observed in the medial surface of the right fibula from the Romano-British burial C211 (grave C24). Indicative of infection of the periosteal membrane covering the bone, such lesions may develop in response to a number of conditions (Manchester 1983, 37); in the absence of supportive evidence (the right tibia was not recovered) spread from a foci elsewhere in the body seems most likely in this case.
Slight woven new bone, indicative of maxillary sinusitis, was observed on the walls and floor of the left antrum from an Anglo-Saxon adult male (C1310). This gives a minimum rate of rate 9% for the condition, which is higher than the 6.8% given by Wells (1977) in his survey of Anglo-Saxon material; the significance of this observation should be tempered by the poor condition of the bone and the relatively small number of burials from which it was possible to observed even parts of the maxilla (11). Slight periosteal new bone was also observed in a redeposited humerus shaft (C1805).

Trauma

The only evidence for direct trauma was a well-healed lateral fracture in the right fibula proximal shaft of the Bronze Age male C4676 (grave C4619; no lesions in the associated tibia). A fracture of this type is most commonly associated with a direct blow over the bone (Adams 1987, 264).

Joint disease

Osteoarthritis is manifest by eburnation of the joint surface and/or pitting in association with osteophytes on joint surface margins; the aetiology is complicated including the effects of age, mechanical alteration through activity or injury and genetic predisposition (Rogers *et al* 1987; Rogers and Waldron 1995, 32-46). Lesions indicative of osteoarthritis were observed one proximal interphalangeal (IP) joint of the fingers from the Romano-British adult male (C4676; 1/48 extra-spinal joints).

Degenerative disc disease - a condition resulting from the breakdown of the intervertebral disc largely related to age and reflecting 'wear-and-tear' (Rogers and Waldron 1995, 26-7) – was noted in the remains of the one Romano-British and two Anglo-Saxon adult males. In the Romano-British, 1/9 vertebrae were affected, with a single lesion in the

cervical region. In the Anglo-Saxon assemblage, 9/43 (21%) vertebrae were affected, with a slightly increased rate of 22.5% for males only. Lesions were roughly equally divided between the cervical and lumbar region.

Osteophytes (irregular growths of new bone along joint margins), pitting and other destructive lesions may develop in response to a number of conditions and it is not always possible to ascertain the specific cause of individual lesions (Rogers and Waldron 1995, 20-31). Spinal and extra-spinal lesions were observed in between one and 11 joints in the remains of four adult males including the one Bronze Age, one Romano-British and two Anglo-Saxons (one with spinal lesions only); most were in synovial joint surfaces and are likely to represent the early stages of osteoarthritis. Lone osteophytes were seen in 3:3 Bronze Age, 1:9 Romano-British and 17:43 (39%) Anglo-Saxon spines (no female vertebrae were recovered); evenly distributed between the cervical, thoracic and lumbar regions occurring in both the body surface margins and the articular process (AP) joints. Extra-spinal lesions were seen in 6:22 Bronze Age joints (upper and lower limb), 8:52 Romano-British (lower limb) and 6:121 Anglo-Saxon (upper and lower limb); the latter were mostly in the meta-phalangeal and IP joints of the hand. Pitting was observed in vertebral AP joints from the Romano-British male (1:9; cervical) and one Anglo-Saxon male (8:43; cervical and lumbar); extra-spinal lesions were seen in 2:52 Romano-British joints (hip joints) and 8:121 Anglo-Saxon (predominantly the cost-vertebral joints).

As with the aforementioned lesions it is not always possible to be conclusive with respect to the aetiology of exostoses, bony growths which may develop at tendon and ligament insertions on the bone. Causative factors include advancing age, traumatic stress, or various diseases. Mild lesions were observed in the dorsal femur shafts and patellae of the Romano-British male and the femoral and radius shaft respectively from two Anglo-Saxon males.

There is limited value in comparing such sparse data with those from other sites since it cannot realistically be seen as representative of the population as a whole.

Cremated remains

The nature of cremated remains and characteristics of the burials (see below) make it difficult to calculate prevalence rates, consequently pathological conditions will be assessed on the basis of number of individuals affected. The aetiology of conditions has been outlined above.

There were indications of maxillary *ante mortem* tooth loss in the remains of the Anglo-Saxon female (C3704) but it is unclear which sockets were affected (small palate fragment).

Several small fragments of what appear to represent the superior body surface of the sacrum from the Anglo-Saxon female C3704 have been modified by micro-pitting and fine-

grained new bone creating a slightly 'melted' appearance. A fragment of proximal humerus shafts redeposited in one of the Iron Age inhumation graves has small area of fine periosteal new bone. Both lesions are indicative of some form of infection, but in the absence of supportive evidence the aetiology is unclear.

Most other lesions seen in the cremated remains are indicative of some form of degenerative joint disease. Lesions indicative of osteoarthritis were seen in a single joint surface (distal IP finer joint) amongst the remains of the Anglo-Saxon female (C3704); the same individual had osteophytes in other DIP (finger) joints and the distal humerus (elbow), the latter also having areas of pitting in the joint surface which may have represented early stages of the disease. Osteophytes were seen in the remains of five other individuals, generally affecting only one or two joints; finger phalanges in two adult females (Late Bronze Age/early Iron Age and Iron Age/Romano-British), thoracic articular process joints in one female (Romano-British) and one male (Late Bronze Age/early Iron Age) and thoracic/lumbar body surface margins in one male (Late Bronze Age/early Iron Age) and one unsexed individual (Romano-British). The lesions were all slight-moderate, and in at least one case - the male thoracic AP joint - associated pitting is likely to reflect this being the early stages of osteoarthritis. Exostoses were observed in the remains of two individuals – one female patella (Iron Age/Romano-British) and one female calcaneum (Romano-British). Little comment can be made with regard to the overall health status of the cremated individuals from these observations, and given the small numbers little inference can be made with regard to temporal variations.

3.5 Pyre technology and cremation ritual

The majority of bone fragments from all deposit types of all periods were white in colour, indicative of full oxidation of the bone (Holden *et al.* 1995a and b). Colour variations were observed in a few bone fragments from three of the 10 Romano-British burials (from graves C20, C22 and C337), one of the Iron Age/Romano-British burials (grave 3008) and the Anglo-Saxon burial (grave 3705). Generally only one or two fragments – mostly skull vault, but in one case the inside of the femur shaft – were blue and/or grey in colour, indicative of incomplete oxidation of the organic components of the bone (*ibid.*). Slightly more extensive skeletal distribution was observed in one of the Romano-British burials, including fragments from the axial, upper and lower limb of the individual, but again no whole bones appear to have been affected and only a few (six) fragments were blue in colour.

Oxidation is influenced by three main requirements – time, temperature and oxygen supply – any one or all of which may be affected by a number of intrinsic or extrinsic factors (McKinley 1994a, 72-81; 2000a). There are three major significant points; cremation takes time, the bone itself must be exposed before it will burn and, since the body is not a good

conductor of heat the bone may not be fully exposed until the pyre has started to burn down and loose its force; the oxygen supply may be cut off or reduced by wrapping the body in leather, skins or furs, or laying it on dense, closely spaced planking with reduced facility for oxygen circulation. The low level variations noted in the Saltwood burials indicate only minor deficiencies. The skull, potentially being at the peripheries of the pyre may not experience sufficient heat for long enough to fully oxidise and/or parts of the vault may fall away from the pyre (a few centimetres would be enough) before fully oxidised; fragments of hand or foot bone may suffer a similar fate. The femur has a thick covering of muscle and there may occasionally be incomplete time/fuel for full oxidation. Other areas of the skeleton e.g. the knee, may have been covered by some external materials for part of the cremation process. There are no clear indications of temporally specific variations in this instance.

All the graves had been truncated to some degree and Table 8 demonstrates the broad correlation between surviving grave depth and quantity of bone recovered – the very low weights and averages from the early Iron Age graves undoubtedly being due to truncation of the graves. However, the surviving grave depths do not provide a consistent indication of the potential level of bone loss which may have occurred as a result (see *Disturbance and Condition*); burials tend to be made at or towards the base of a grave cut and a substantial depth of the fill may be removed with no consequent loss of bone, particularly in unurned burials which were not contained in a upstanding urn (though most were probably originally made in a container of some sort). These observations place constraints on the significance which may be attached to the quantities of bone included within the burials.

Table 8: Cremated bone weight ranges and averages from burials by phase

Phase	*wt. Range*	*average wt.*	*range grave depths*	*average grave depth*
Late Bronze Age/early Iron Age	134-407.5g	270.7g	0.07-0.40m	0.23m
Early Iron Age	10.8-32.5g	23.1g	0.06-0.07m	0.06m
late Iron Age/Romano-British	41-470.0g	202.4g	0.10-0.30m	0.20m
Romano-British	15.5 – 816g	214.7g	0.05-0.21m	0.10m
Anglo-Saxon	578.7g	578.7	0.28m	

The maximum Late Bronze Age/early Iron Age and late Iron Age/Romano-British weights represent a maximum of *c.* 40% of the expected weight of bone from an adult cremation, probably more in the region of 25% (McKinley 1993a); maximum Romano-British weight represents a maximum of *c.* 81%, probably more like 51% and the Anglo-Saxon burial a maximum *c.* 58%, probably more in the region of 36%. The weights from the immature individuals are, as may be expected, lower than for the adults but there is no apparent

variation on the basis of sex, the greatest and least weights from the Romano-British assemblage both being from the burials of females.

Comparison of the Romano-British data with those from other (generally larger) contemporaneous cemeteries show the range and average to be closest to those seen in other rural cemeteries – with the exception of Ash, Kent - generally falling well short of the figures for the towns (Table 9). This may in part reflect a genuine urban/rural divide, perhaps linked to the influence of the greater numbers found in the urban cemeteries, but it may be worth observing that the bone from Westhampnett and Low Borrowbridge was not well preserved, trabecular bone being largely absent from both and that very large bone weights were recovered from the urned burial at Ash (Table 9).

Table 9: Comparative bone weight ranges and averages from Romano-British cemeteries.

Cemetery	**weight ranges**	**averages**
Puckeridge (Wells 1981)	84-2127g (all individuals, types & condition of burials)	Series A: 214g Series B: 634g SG: 796g
Welwyn (Wells 1981)	37-2381g (all individuals, types & condition of burials)	584g
Cranmer House, Canterbury, Kent (Garrard 1987)	25-5975g (all individuals, types – including duals - & condition of burials)	798g
Baldock Area 15, Herts. (McKinley 1991)	undisturbed adult burials: unurned 1-1599.1g urned 100-1419g	452.0g 619.2g
St. Stephens, St. Albans (McKinley 1992)	undisturbed adult burials: urned 71-1447.2g	899.6g unurned 824g
Low Borrowbridge, Cumbria (McKinley 1996)	all burials 1-498.9g (only one totally undisturbed)	179.1g
Westhampnett , W. Sussex (McKinley 1997a)	undisturbed adult burials: 302.9-687.1g	531.7g
Each End, Ash (Anderson 1998)	all urned burials (no individual figures) undisturbed urned burials 859-1959g	947g 1, 317g

The weight of bone from the Anglo-Saxon burial is slightly lower than the average observed in contemporaneous burials from northern and central-eastern England (*c*. 800g for undisturbed adult burials; McKinley 1993b; 1994a, 85), but data from more southerly cemeteries suggests there may have been a regional variation with, on average, smaller quantities of bone being included in the burials (McKinley forthcoming).

There are a number of factors which may affect the size of cremated bone fragments the majority of which are exclusive of any deliberate human action other than that of

cremation itself (McKinley 1994b). Levels of truncation to the graves (Table 8) clearly comprised a factor in the degree of fragmentation seen in the bone from burials of different phase (Table 10); representing a major factor with respect to the Iron Age and Romano-British burials, though the latter have faired better probably due to the burials having been made in urns thereby providing added protection. On average the levels of fragmentation in the Bronze Age/Iron Age and Iron Age/Romano-British burials were relatively high but variable, again reflecting the range of grave depths, though in these cases there may be some indication of increased fragmentation, possibly reflective of pyre tending practices; the same may also be the case with the Anglo-Saxon burial.

Table 10: Summary of fragmentation in cremation burials by phase

Phase	*% bone by wt. in 10mm fraction*	*maximum fragment*
Late Bronze Age /early Iron Age	20% -42% (max. in 5mm fraction)	45mm – 56mm
early Iron Age	15-52% (one max. in 5mm fraction)	20-46mm
late Iron Age/Romano-British	16-66% (one max. in 5mm other in 2mm fraction)	22-71mm (average 41mm)
Romano-British	55-85% (average 72%)	16-83mm (average 41mm)
Anglo-Saxon	48% (max. in 5mm)	68mm

The generally low weights of bone recovered renders any assessment of the skeletal elements collected for burial difficult; the percentage of bone which could be identified to skeletal elements was also occasionally very low and the may have further skewed the results. In general, those burials with >200g of bone showed a 'normal' distribution of skull, axial, upper and lower limb elements (McKinley 1997a, 69) with no indication that a distinction was being made between elements during collection for burial. The one period for which the results appear unusual is the Romano-British, where all the burials were made urned; here, one grave (C16) contained no skull fragments (generally the easiest skeletal elements to identify and consequently within a 'normal' distribution representing a high percentage of identifiable skeletal elements), other graves (C19, C21, C22) contained only very small amounts of skull with lower limb elements predominating in each case. All four of these graves were truncated and some bone had probably been lost from the burials, only the lower part of the urn surviving. It may be that rather than skull having been excluded from the burials, different skeletal elements were distributed within different parts of the urn; the lower limb towards the base and most of the skull fragments towards the top, though some fragments would inevitably filter down through the fill. If this were the case, the implication

is that the bone was put in the urn as it was collected from the pyre for burial, collection commencing at the foot end of the pyre and working up towards the head end. Other Romano-British burials with small amounts of bone do not show the same pattern so if this were a result of collection procedures it was clearly not followed every time. The burials with larger quantities of bone (e.g. graves C14 and C337) show a more 'normal' distribution of skeletal elements, but as the vessels were not emptied in spits it is not possible to deduce if they had an ordered deposition of skeletal elements.

The burials from each phase which had suffered least disturbance (discounting the early Iron Age ones which were both very disturbed), each contained fragments of the small bones of the hands and or/feet and a few tooth roots; this was particularly noticeable in the two burials with the largest quantities of bone, the Romano-British C336 (grave C337) and the Anglo-Saxon C3704 (grave C3705) the latter holding two tooth roots, 14 finger phalanges and three foot phalanges. The inclusion of these small skeletal elements may reflect a collection procedure which included raking-off the upper levels of the burnt-out pyre to recover bones rather than hand collection of individual fragments from the surface, thereby enhancing the chance of recovering such small bones. On the current evidence there is no clear distinction between the different phases but it may be worth noting that a paucity in these skeletal elements has been observed and discussed by the writer with respect to other Romano-British cemeteries, e.g. Brougham, Cumbria (McKinley 2004c), and their relative frequency here may be indicative of regional – or maybe simply local – variation; Anderson observed that very few of these bone were found in the burials from Ash (1998, 125).

Pyre goods, in the form of small quantities (0.1-5g) of cremated animal bone (see Section 00 for species) were recovered from five burials including four Romano-British (40%) and one of the two Iron Age/Romano-British. The tradition is relatively common in all periods within which the mortuary rite was practised; for example, 3.5-47% of Romano-British burials from a range of cemeteries contained cremated animal remains (McKinley 2004c, 331-332). The burials were all those of adults with the exception of one possible subadult/adult (>13 yr.) and the two sexed individuals were both female (one Romano-British, the other Iron Age/Romano-British). A fragment of unburnt animal bone – a pig molar – was recovered from the upper, disturbed fill of Romano-British grave C60. It cannot conclusively be stated whether this comprised an incidental inclusion or the remains of an offering inserted when the burial was made; the inclusion of animal offerings as grave goods is relatively common in the Romano-British period (e.g. Bond and Worely 2004).

Pyre debris – mainly fuel ash with other archaeological components including cremated bone not collected from the pyre site for burial (McKinley 1997b; 2000c) – was recovered from two Romano-British grave fills (C14 and C336) and the backfills of all the graves containing unurned burials with the exception of the Late Bronze Age/Iron Age

C3711. The inclusion of pyre debris in grave fills is a common characteristic of the rite throughout its use and reflects the proximity of the pyre site to the place of burial (McKinley 1997a; 2000b). The temporal exception to this part of the rite has been the Anglo-Saxon period as represented by the cemeteries in central and north-eastern England (McKinley 1993b; 1994), though the Anglo-Saxon grave C3704 has added to what is an inconclusive but growing corpus of data suggesting a southern regional variation where pyre debris was incorporated in the grave fills (McKinley forthcoming). In the urned Romano-British grave C14, the pyre debris - containing 14% of the cremated bone from the grave – was deposited over the urned burial. In grave C336 the original relationship between the debris and the urned burial is unclear since the grave appears to have been subject to robbing in antiquity; the urned burial having been removed, the vessel smashed and the then mixed components returned to the grave. The components of the unurned burials visually appeared to comprise a mix of fuel ash and cremated bone; however, several of the Iron Age and/or Romano-British graves (W1726, W1728, W3336 and W3602) were excavated by section, quadrant and/or spits and it was thereby possible to show that the bone had been concentrated within one half of the grave fills and towards the lower levels.

Four deposits were deemed to represent the remains of redeposited pyre debris rather than burials (McKinley 1997b; 2000c). In each case the quantities of bone recovered were very low (*c*. 6-18g), representing the remains of adults and recovered from features of a relatively good depth (0.17-0.28m). Deliberate 'burial' of redeposited pyre debris appears to have been carried out in several periods in which the mortuary rite was practised (McKinley 1997b; 2000c); whether this represented a purely practical 'cleaning-up' process, as may be the case for the material dumped in ditch 1695, or part of the 'closure' of burial is uncertain, but the latter is likely to be the case where formal disposal has occurred. The paucity of remains (between 1-10g of bone) and lack of contextual data/definition from six, largely undated deposits (C1699 was dated as early Iron Age) renders their interpretation inconclusive, they could represent the remains of burials, redeposited pyre debris or incidental inclusion of scattered material.

4 DISCUSSION

Only a small number of Bronze Age burials – probably less than 40, with roughly equal numbers of inhumation and cremation burials – have currently been recorded from sites in Kent (Mays and Anderson 1995), consequently any increase in numbers is significant. There are also relatively few Iron Age burial sites, most concentrated along the north-east coast, with probably less than 100 recorded burials, mostly by inhumation (*ibid*.); the addition of the seven cremation and inhumation burials from Saltwood whilst not substantial, increases the distribution – few cemetery sites of any date having been recorded this far south – as well as

the small recorded numbers. The recorded number of Romano-British burials – concentrated in the north and NE of the county and including some large cemeteries – are higher than for the earlier phases, approaching 200, but still relatively low when viewed nationally (*ibid*.). Cremation burials are relatively few, mostly – as here - derived from mixed-rite grave groups, Saltwood apparently forming the second largest group of cremation burials after Cranmer House, Canterbury (42: Frere *et al* 1987). In contrast, the number of Anglo-Saxon cemeteries and burials is relatively large (>1000 inhumation burials) though many are either 'incompletely reported' or the condition of the bone – as here – is poor (Mays and Anderson 1995, 376). The number of cremation burials for this period is very few (*ibid.*), almost all (16) having been recovered from the mixed rite cemetery at Orpington on the western margins of the county but for which there is no bone report (Tester 1968).

Although not conclusive – given the very poor condition of the remains – grave W1810 appeared to contained the remains of a dual burial comprising a young adult (18-25 yr.; unsexed) and an infant (0.5-5 yr.). The singularity of this occurrence may be misleading since in other cases the bone may have disappeared entirely and, as in this case, there may be no other indications of the original dual occupation of the grave (Riddler and Trevarthen, 2006, fig. 63). The combination of an adult with an immature individual forms the most common type of multiple inhumation burials in the Anglo-Saxon period (Lucy 2000, 82).

The presence of a single Anglo-Saxon cremation grave amongst a complex of 213 inhumation graves appears a little incongruous. The grave is set amongst the inhumation graves – one of which it cut - associated with the central barrow. Cremation burials of this date from Kent are rare (Tester 1968; Mays and Anderson 1995, 376; Lucy 2000, fig. 4.7). Why would this one individual be cremated when all others were inhumed? The clearest implication is that this individual was of a different ethnic or cultural origin to the others; there are characteristics of the burial – unurned, inclusion of pyre debris, absence of pyre goods – which signify it has more in common with southern cremation burials than those of central or northern England (McKinley forthcoming) but it is clearly distinguished from its neighbours.

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